

What is claimed is:

1. An optical recording medium comprising:
a wobbled track on which user data is recorded; and
a header area on which a header signal having multi-modulated header
5 information is recorded.
2. The optical recording medium of claim 1, wherein first and second header
information modulated according to first and second types of modulation, respectively,
overlap each other in at least some of intervals of the header signal.
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3. The optical recording medium of claim 2, wherein the first type of
modulation is one of phase modulation, frequency modulation, and amplitude
modulation, and the second type of modulation is one of the remaining two types of
modulation.
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4. The optical recording medium of claim 1, wherein first through third header
information modulated according to first through third types of modulation overlap one
another in at least some of intervals of the header signal.
- 20 5. The optical recording medium of claim 4, wherein the first type of
modulation is one of phase modulation, frequency modulation, and amplitude
modulation, the second type of modulation is one of the remaining two types of
modulation, and the third type of modulation is the last one.
- 25 6. The optical recording medium of claim 1, wherein first through N-th header
information modulated according to first through N-th types of modulation, respectively,
overlap one another in at least some of intervals of the header signal.

7. The optical recording medium of claim 1, wherein the header area further includes a header flag region on which a flag signal indicative of the beginning of the header area positioned between adjacent wobbled tracks is recorded.

5 8. The optical recording medium of claim 7, wherein a direct current signal is recorded on the header flag region.

9. The optical recording medium of claim 7, wherein the header flag region is formed as a mirror region.

10 10. The optical recording medium of any one of claims 1 through 9, wherein the wobble signal has a single frequency.

11. The optical recording medium of claim 10, wherein the header signal has a frequency higher than that of the wobble signal.

15 12. The optical recording medium of any one of claims 1 through 9, wherein the wobbled track and the header area are positioned alternately.

20 13. The optical recording medium of any one of claims 1 through 9, wherein the wobbled track, which is a user data area for recording user data, includes land and groove tracks.

25 14. A method for recording header information on a header area on an optical recording medium on which a wobble signal is recorded, the method comprising the steps of:

- (a) generating a header signal having multi-modulated header information; and
- (b) recording the generated header signal.

15. The method of claim 14, wherein, in the step (a), a header signal including at least some of intervals where first and second header information modulated according to first and second types of modulation, respectively, overlap each other is generated.

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16. The method of claim 15, wherein the first type of modulation is one of phase modulation, frequency modulation, and amplitude modulation, and the second type of modulation is one of the remaining two types of modulation.

10 17. The method of claim 14, wherein, in the step (a), a header signal including at least some of intervals where first through third header information modulated according to first through third types of modulation, respectively, overlap one another is generated.

15 18. The method of claim 17, wherein the step (a) comprises the steps of:
(a1) modulating the first header information according to a first type of modulation;
(a2) modulating the second header information according to a second type of modulation;
20 (a3) modulating the third header information according to a third type of modulation; and
(a4) overlapping the signals obtained in the steps (a1)-(a3).

25 19. The method of claim 18, wherein the first type of modulation is one of phase modulation, frequency modulation, and amplitude modulation, the second type of modulation is one of the remaining two types of modulation, and the third type of modulation is the last one.

20. The method of any one of claims 14 through 19, wherein the wobble signal has a single frequency.

21. The method of claim 20, wherein the header signal has a frequency higher
5 than that of the wobble signal.

22. The method of any one of claims 13 through 19, wherein the wobbled track and the header area are positioned alternately.

10 23. An apparatus for recording a header signal on a header area on an optical recording medium on which a wobble signal is recorded, the apparatus comprising:

a multi-modulator that multi-modulates header information and generates a header signal; and

15 a recording portion for recording the generated header signal.

24. The apparatus of claim 23, wherein the multi-modulator generates a header signal including at least some of intervals where first and second header information modulated according to first and second types of modulation, respectively,
20 overlap each other.

25. The apparatus of claim 23, wherein the multi-modulator comprises:

a first modulator for modulating the first header information according to a first type of modulation;

25 a second modulator for modulating the second header information according to a second type of modulation; and

a signal synthesizer for overlapping the signals output from the first and second modulators in at least some of intervals.

26. The apparatus of claim 25, wherein the first type of modulation is one of phase modulation, frequency modulation, and amplitude modulation, and the second type of modulation is one of the remaining two types of modulation .

5 27. The apparatus of claim 23, wherein the multi-modulator comprises:
a first modulator for modulating first header information according to a first type of modulation;
a second modulator for modulating second header information according to a second type of modulation;
10 a third modulator for modulating third header information according to a third type of modulation; and

a signal synthesizer for overlapping the signals output from the first through third
15 modulators in at least some of intervals.

28. The apparatus of claim 27, wherein the first modulator performs one of phase modulation, frequency modulation, and amplitude modulation, the second modulator performs one of the remaining two types of modulation, and the third
20 modulator performs the last one.

29. A method for reproducing header information from a header area on an optical recording medium on which a wobble signal is recorded, the method comprising the steps of:

25 (a) reading a header signal having multi-modulated header information;
 (b) demodulating at least some of intervals of the read header signal according to a first type of demodulation to obtain first header information;
 (c) demodulating the intervals of the read header signal according to a second type of demodulation to obtain second header information; and

(d) combining the first and second header information obtained in the steps (b) and (c), respectively, to output the combined header information.

5 30. A method for reproducing header information from a header area on an optical recording medium on which a wobble signal is recorded, the method comprising the steps of:

 (a) reading a header signal having multi-modulated header information;

 (b) demodulating some of intervals of the read header signal according to a first type of demodulation to obtain first header information;

10 (c) demodulating the intervals according to a second type of demodulation to obtain second header information;

 (d) demodulating the intervals according to a third type of demodulation to obtain third header information; and

15 (e) combining the first through third header information obtained in the steps (b)-(d) to output the combined header information.

 31. An apparatus for reproducing header information from a header area on an optical recording medium on which a wobble signal is recorded, the apparatus comprising:

20 a reading portion that reads a header signal having multi-modulated header information;

 a first demodulator that demodulates at least some of intervals of the read header signal according to a first type of demodulation and obtains first header information;

25 a second demodulator that demodulates the intervals according to a second type of demodulation and obtains second header information; and

 a header information synthesizer that combines the first and second header information and outputs the combined header information.

 32. The apparatus of claim 31, further comprising a third demodulator that

demodulates the intervals according to a third type of demodulation to obtain third header information, wherein the header information synthesizer combines the third header information with the first and second header information.